Luke Waterdog Recreation Annex (WRA)

Boundaries:

The Waterdog Recreation Annex is situated on the east shore of Apache Lake in Maricopa County, Arizona.

Site History:

- The site was operated by the U.S. Air force as a recreational annex for Williams Air Force Base (AFB) military and civilian personnel.

- On June 12, 1991, Williams AFB personnel noticed a strong fuel odor and sheen on Apache Lake. On June 26, 1991, the remaining product was removed from the underground storage tanks (USTs) located near the boat dock. In December of 1991, approximately 135 cubic yards of petroleum hydrocarbon contaminated soil were removed from the site and disposed of at a disposal facility, and the excavation was backfilled with clean fill.

- After the closure of Williams AFB on September 30, 1993, the annex was transferred to Luke AFB.

- In April 1994, a field investigation was completed at the site to determine the extent of soil contamination. The investigation indicated that the soils near the former tank pit were contaminated with petroleum hydrocarbons.

- A bioventing system was installed and began operation in June 1995.

- In January and July of 1996, groundwater samples were collected from wells VMP-4, and MW-1. Benzene, toluene, ethylbenzene, and total xylenes (BTEX) were detected above the Arizona Aquifer Water Quality Standard (AAWQS).

- In March 1997, the bioventing system was converted to a soil vapor extraction (SVE) system.

- Groundwater samples were collected at the site in July, September, and December 1999 from wells MW-1, MW-2, MW-3, and MW-4. Benzene was detected above the AAWQS in all wells during each event.

- In March 2000, groundwater samples collected from all of the monitoring wells exceeded the AAWQS for benzene, and MW-4 exceeded the AAWQS for toluene.

- Since MW-1, MW-2, MW-3 and MW-4 were all in the area of contamination, MW-5, 6, and 7 were installed in April 2001 outside the source of contamination strictly for groundwater monitoring.

- MW-8 and 9 were installed in December 2002, in preferentially fractured zones near the former UST location, as identified in the complex resistivity (CR) survey that was done in November 2002.

- SVE wellheads, surface piping, and system enclosure were installed. Monitor wells MW-1, MW-2, MW-3, and MW-4 were plumbed and manifolded for the SVE system. Groundwater pumping is intended to dewater the bedrock. The results of groundwater sampling indicate that the limits of the extent of the benzene plume are within an area defined by the newly installed monitor wells.

- During February, March, and again in July 2003, further modifications and improvements were made to the existing soil vapor extraction (SVE)/catalytic oxidation system presently operating at the site. Preliminary testing indicates influent flow rate from one well (MW-4) has increased by a factor of three. Influent volatile organic compound (VOC) concentrations from this well increased by a factor of two.

- From October 1, 2001 to January 2, 2004, 4,688 lbs of VOCs were removed using the SVE/catalytic oxidation system

Site Status:

- The SVE/catalytic oxidation system is still operating and continues to remove VOCs.

- The sub-surface formation at this site is fractured bedrock and does not allow an adequate range of influence (ROI) for the vapor extraction. There is no communication between one extraction well and another. Therefore, the site is only cleaned up "one hole at a time." New extraction wells will need to be drilled to order to remove more of the contamination.

- From July 1, 2004 to June 30, 2005, approximately 445 lbs of VOCs were removed using the SVE/catalytic oxidation system.

Site Hydrogeology:

- The WRA is situated on granitic bedrock and weathered Precambrian granite. Based on the drilling logs, the local geology consists of approximately four to seven feet of silt and/or sand, underlain by alternating weathered and less weathered granitic bedrock. Competent bedrock was encountered in wells MW-3 and MW-4 at depths of 16.5 and 27 feet below ground surface (bgs), respectively.

- Granite bedrock was cored from 30 to 40 feet bgs at MW-4. The core was observed to be highly fractured. Fractures are open and inclined at 45 to 75 degrees. The bedrock has no primary permeability and moderate to high secondary permeability from fractures.

- The U.S. Geological Survey (USGS) quadrangle map indicates the site is located at approximately 1,940 feet above mean sea level (MSL). Normal lake elevation is reported at 1,914 feet above MSL.

- Depth to groundwater at the WRA site ranges from 14 to 27 feet bgs, and fluctuates according to the seasonal rise and fall of the water level in Apache Lake, based on the topography of the site and the close proximity of the lake. The groundwater flows to the southeast, away from the lake in the summer, and changes direction to the northwest, toward the lake, in the winter.

Contaminants:

The current contaminants of concern at this site include: benzene, toluene, ethylbenzene, and total xylenes (BTEX). The source of the benzene is believed to be gasoline smeared in the weathered and fractured bedrock below the water table. Contaminants of concern at the site may change as new data become available.

Public Health Impacts:

Based on the physicochemical properties of BTEX compounds and its minimal persistence in surface water, the exposure pathway from either ingestion or dermal absorption of water from Apache Lake by humans is not significant.

Community Involvement Activities:

No community involvement activities are planned at this time.

Information Repository:

Interested parties may review site information at the ADEQ main office located at 1110 W. Washington Street, Phoenix. Site information is available for review Monday through Friday from 8 a.m. to 5 p.m. To arrange for a time to review the public site file, please call the ADEQ Records Management Center at (602) 771-4380 or (800) 234-5677 (Arizona toll free).

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*In Arizona, but outside the Phoenix area, call toll-free at (800) 234-5677, ext 771-4187.